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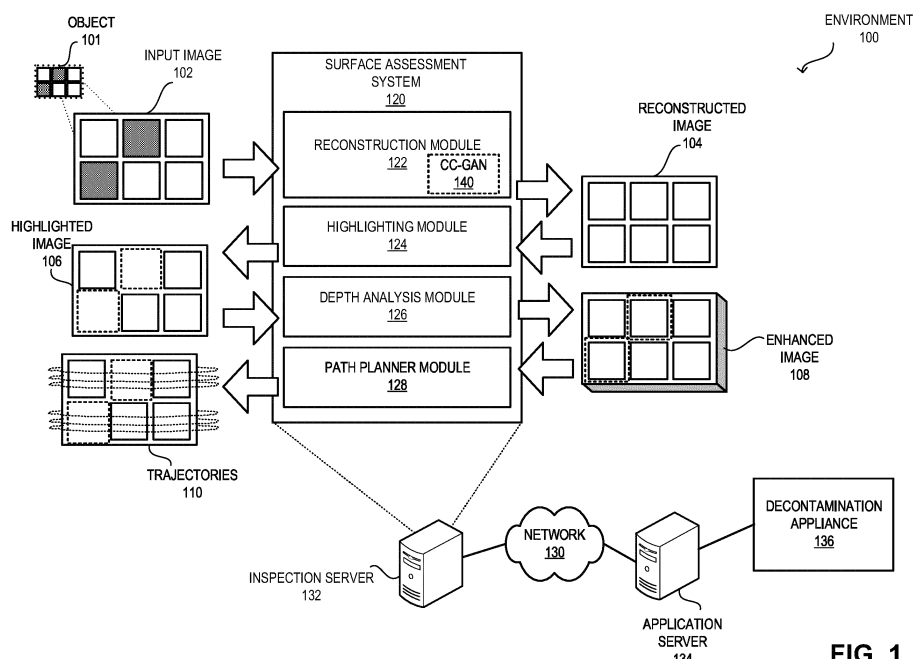
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(54) **SYSTEM AND METHOD FOR AUTOMATED SURFACE ASSESSMENT**

(57) Embodiments described herein provide a system for assessing the surface of an object for detecting contamination or other defects. During operation, the system obtains an input image indicating the contamination on the object and generates a synthetic image using an artificial intelligence (AI) model based on the input image. The synthetic image can indicate the object with-

out the contamination. The system then determines a difference between the input image and the synthetic image to identify an image area corresponding to the contamination. Subsequently, the system generates a contamination map of the contamination by highlighting the image area based on one or more image enhancement operations.



**FIG. 1**



## EUROPEAN SEARCH REPORT

Application Number  
EP 20 18 5376

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	ZHAO ZHIXUAN ET AL: "A Surface Defect Detection Method Based on Positive Samples", 27 July 2018 (2018-07-27), BIG DATA ANALYTICS IN THE SOCIAL AND UBIQUITOUS CONTEXT : 5TH INTERNATIONAL WORKSHOP ON MODELING SOCIAL MEDIA, MSM 2014, 5TH INTERNATIONAL WORKSHOP ON MINING UBIQUITOUS AND SOCIAL ENVIRONMENTS, MUSE 2014 AND FIRST INTERNATIONAL WORKSHOP ON MACHINE LE, XP047481215, ISBN: 978-3-642-17318-9 [retrieved on 2018-07-27]	1,4,5, 9-11,14, 15,19,20	INV. G06T7/00
Y	* abstract; figure 2 * * section 3 *	2,3,12, 13	
X	KOMOTO KYOSUKE ET AL: "A performance evaluation of defect detection by using Denoising AutoEncoder Generative Adversarial Networks", 2018 INTERNATIONAL WORKSHOP ON ADVANCED IMAGE TECHNOLOGY (IWAIT), IEEE, 7 January 2018 (2018-01-07), pages 1-4, XP033352573, DOI: 10.1109/IWAIT.2018.8369766	1,4,5, 9-11,14, 15,19,20	TECHNICAL FIELDS SEARCHED (IPC) G06T
Y	* abstract; figures 4,5 * * section V. *	2,3,12, 13	
Y	ZHU JUN-YAN ET AL: "Unpaired Image-to-Image Translation Using Cycle-Consistent Adversarial Networks", 2017 IEEE INTERNATIONAL CONFERENCE ON COMPUTER VISION (ICCV), IEEE, 22 October 2017 (2017-10-22), pages 2242-2251, XP033283087, DOI: 10.1109/ICCV.2017.244 * the whole document *	2,3,12, 13	
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 11 December 2020	Examiner Krawczyk, Grzegorz
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-5, 9-15, 19, 20

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION**  
**SHEET B**

Application Number

EP 20 18 5376

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-5, 9-15, 19, 20

Visual highlighting of surface defects of an object in an image. Input image and a synthesized defect-free image are compared to determine locations of defects which are then visually highlighted. A particular generative adversarial network is used to synthesize the defect-free image.

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2. claims: 6-8, 16-18

Trajectory generation for an (autonomous) appliance. Depth information is determined for the object and is used to generate a mesh on which the locations of the defects are projected to. The trajectories are determined based on this data.

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